

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

U. S. Department of Agriculture

Forest Service

APPALACHIAN FOREST EXPERIMENT STATION

Technical Note No. 15
Management - Coastal Plain

Asheville, N. C.
October 28, 1933.

A METHOD OF DETERMINING DENSITY OF LOBLOLLY PINE STANDS

By

A. L. MacKinney, Associate Silviculturist
L. E. Chaiken, Junior Forester

The evaluation of the density of stocking of even-aged stands is of considerable importance in the determination of yield, the prediction of growth, and the comparison of stands. Lacking better means, foresters have computed density as the ratio of either the volume, basal area, or number of trees per acre for a given stand of known age and site to corresponding values in normal yield tables. A new method recently developed ^{1/} allows the evaluation of density of stocking by referencing the number of trees per acre growing in a stand of known average diameter to the number which would be present if the stand were densely stocked.

This technical note presents a table showing the number of trees per acre which occur in densely stocked stands of loblolly pine having different average diameters. The figures presented do not necessarily represent the number of trees which an area should support to give best growth or maximum yield, but instead are presented for use as base values to which other stands may be referenced. It is proposed that values presented in the attached table be considered as representing 100% stocking until further investigations provide

^{1/}

. Reineke, L. H. Perfecting a stand-density index for even-aged forests. Jour. Agr. Research, Vol. 46, p. 627-637, 1933.

a sound basis for changing them. These tabular values were derived from a re-analysis of the field data collected by the Southern Forest Experiment Station as representing fully stocked stands for use in the preparation of normal yield and stand tables for loblolly pine ^{2/}.

In using the table to determine the density of a given stand only the average diameter of the stand and the number of trees per acre over 1.0 inches in diameter need be determined. The number of trees which represent 100% stocking for the given average diameter is then read from the table and the density of the stand determined by dividing the actual number of trees by the number necessary for 100% stocking. The following example illustrates the procedure:

| | | |
|-----------------|--------------------------|--------------|
| Given, a stand: | No. of trees per acre | = 500 |
| | Average D.B.H.o.b. (from | |
| | average basal area) | = 6.4 inches |

| | |
|--|-------|
| Number of trees per acre for a 100% | |
| stocked stand with average diameter of | |
| 6.4 inches (read from table) | = 607 |

Density of given stand = 500 divided by 607 = 82%

^{2/} U.S.D.A. Volume, Yield, and Stand Tables for Second-Growth Southern Pines. U.S.D.A. Misc. Pub. 50, September, 1929.

Number of Trees Necessary for 100% Stocking
in Loblolly Pine Stands of Different Average Diameters

| <u>1/</u> Average Base No. D.B.H. of trees o.b. per acre | <u>2/</u> Average Base No. D.B.H. of trees o.b. per acre | <u>1/</u> Average Base No. D.B.H. of trees o.b. per acre | <u>2/</u> Average Base No. D.B.H. of trees o.b. per acre | <u>1/</u> Average Base No. D.B.H. of trees o.b. per acre | <u>2/</u> Average Base No. D.B.H. of trees o.b. per acre | <u>1/</u> Average Base No. D.B.H. of trees o.b. per acre | <u>2/</u> Average Base No. D.B.H. of trees o.b. per acre |
|---|---|---|---|---|---|---|---|
| 1.0 | 14,420 | 6.0 | 677 | 11.0 | 240 | 16.0 | 127 |
| 1.2 | 10,560 | 6.2 | 641 | 11.2 | 233 | 16.2 | 124 |
| 1.4 | 8,121 | 6.4 | 607 | 11.4 | 226 | 16.4 | 121 |
| 1.6 | 6,466 | 6.6 | 575 | 11.6 | 220 | 16.6 | 119 |
| 1.8 | 5,285 | 6.8 | 547 | 11.8 | 214 | 16.8 | 117 |
| 2.0 | 4,416 | 7.0 | 520 | 12.0 | 207 | 17.0 | 115 |
| 2.2 | 3,753 | 7.2 | 496 | 12.2 | 201 | 17.2 | 113 |
| 2.4 | 3,235 | 7.4 | 473 | 12.4 | 196 | 17.4 | 110 |
| 2.6 | 2,821 | 7.6 | 452 | 12.6 | 191 | 17.6 | 108 |
| 2.8 | 2,488 | 7.8 | 433 | 12.8 | 186 | 17.8 | 106 |
| 3.0 | 2,211 | 8.0 | 414 | 13.0 | 181 | 18.0 | 104 |
| 3.2 | 1,981 | 8.2 | 397 | 13.2 | 176 | 18.2 | 102 |
| 3.4 | 1,788 | 8.4 | 381 | 13.4 | 172 | 18.4 | 100 |
| 3.6 | 1,621 | 8.6 | 366 | 13.6 | 168 | 18.6 | 98 |
| 3.8 | 1,475 | 8.8 | 352 | 13.8 | 164 | 18.8 | 96 |
| 4.0 | 1,353 | 9.0 | 339 | 14.0 | 160 | 19.0 | 94 |
| 4.2 | 1,245 | 9.2 | 326 | 14.2 | 156 | 19.2 | 93 |
| 4.4 | 1,151 | 9.4 | 314 | 14.4 | 152 | 19.4 | 91 |
| 4.6 | 1,064 | 9.6 | 303 | 14.6 | 148 | 19.6 | 90 |
| 4.8 | 990 | 9.8 | 293 | 14.8 | 145 | 19.8 | 89 |
| 5.0 | 924 | 10.0 | 283 | 15.0 | 142 | 20.0 | 87 |
| 5.2 | 864 | 10.2 | 274 | 15.2 | 139 | 20.2 | 86 |
| 5.4 | 812 | 10.4 | 265 | 15.4 | 136 | 20.4 | 84 |
| 5.6 | 762 | 10.6 | 256 | 15.6 | 133 | 20.6 | 83 |
| 5.8 | 718 | 10.8 | 248 | 15.8 | 130 | 20.8 | 82 |
| | | | | | | 21.0 | 80 |

1/

. Average D.B.H.o.b. is the diameter breast high outside bark for the tree of average basal area.

2/

. These values were obtained from the regression equation

Logarithm of number of trees per acre = -1.707 logarithm of average D.B.H.o.b. of the stand + 4.1588; for which the correlation coefficient is .9625, and the standard error of estimate is $\pm .0862$ in logarithmic units, or $\pm 17.2\%$.

